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Dr. T. M. Brewer is engaged in preparing for the press the second and last part of the *North American Oölogy*, the first part of which appeared in volume seven of the Smithsonian "Contributions." The eggs and nests of about one hundred and fifty birds will be described. The illustrations will consist of about one hundred figures, in five or six 4to plates.

We have received some advance sheets of a work on the *Ornithology and Oölogy of New England.* By Edward A. Samuels. Nichols & Noyes, Boston. We shall give a farther notice of it hereafter. It will contain over five hundred 8vo pages, and be illustrated by twenty-three plates of Birds, four plates of Eggs, and a large number of wood-cuts.

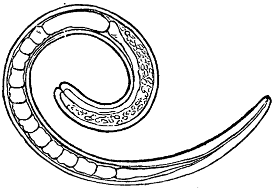
CORRESPONDENCE.

In answer to several inquiries regarding the disease resulting from eating pork infested by the Trichina, we print the following account kindly prepared for the *Naturalist* by a well-known authority on this subject:—

Trichina spiralis.—This entozoön is the cause of a serious and often fatal disease of the intestinal canal and muscular system of man, called Trichiniasis or Trichinosis, which is produced by eating the flesh of swine similarly affected. Before giving an account, however, of the natural history of this parasite, it may be well to state that trichinous pork is not measly pork. Measles in the hog is the encysted stage of the common tape-worm of man (*Tænia solium*). Measly flesh being eaten, the little cysts or scolices, as they are called, which consist of the future head of the mature animal inverted, escape from their sacs within the stomach, unless previously destroyed by cooking, and attach themselves by their armed heads to the intestinal walls. From this head are developed one after another the joints which make up the body of the tape-worm. The first formed or oldest joints, or proglottides, when sexually mature, escape from the intestinal canal of their host, and, being eaten by swine, the ova they contain are set free. During digestion, the eggshells are dissolved, and the minute embryos find their way into the tissues of their new host, to be again converted into encysted scolices, or measly pork. In this stage the tape-worm is called Cysticercus cellulosæ.

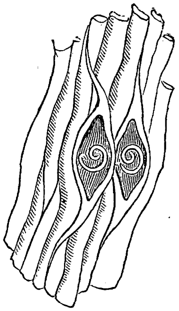
The Trichina spiralis, on the other hand, does not belong to this order of Cestoidea or encysted worms, but to the Nematoidea or round worms (of which the pin-worm is an example), and its development is much less complicated. If trichinous pork is examined by the microscope, the muscular fibres will be found occupied by minute cysts varying in size, from 1-30th to 1-60th of an inch in length, and 1-100th to 1-150th of an inch in thickness; thirty-five thousand of these have been counted in a single cubic inch of muscle, and it has been estimated that an ounce of such flesh would contain three million cysts. Within them may be seen coiled upon itself, in a spiral form, the young worm, which, when removed by pressure, measures 1-25th of an inch in length, and 1-620th of an inch in diameter. The cysts and young are represented in the accompanying figures. (Fig. 1, the young worm; and Fig. 2, the cysts, after Dalton.) If now such pork is eaten by man, the cysts are dissolved during digestion, and the young worms, unless previously destroyed by cooking, or other process, are set free, to enter the intestinal canal. There they lose their spiral form, increase rapidly in size, and become sexually mature in a few days. Both sexes are at first found in equal numbers, but after impregnation the females alone remain, and by the tenth or fourteenth day the males, which are much the smaller, have all perished. The time required for the development of the embryos is from four to eight days, after which they begin to leave the oviduct in the form of exceedingly small, transparent worms. They may continue to be discharged in immense numbers, however, for six weeks, inasmuch as time is required for the development of the whole number of ova; from three hundred to five hundred in each individual. Immediately after birth the young leave the residence of the adults, the intestinal canal, and give rise to the first symptoms indicative of their presence. They bore into the intestinal walls, and wander along the areolar tissue, penetrating to nearly all parts of the muscular system. Entering the primitive bundles of this tissue, which they devour as they proceed, they increase in size, and finally coil themselves up and remain quiescent. Sooner or later an oval membranous capsule is formed about them, which eventually becomes cretaceous and opaque, and gives to the muscles a white, sanded appearance. The time required for these processes is various. The wandering begins immediately after birth, but it may be several weeks before the whole brood has found its final resting-place. In this qui-

Fig. 1.



Trichina spiralis. Magnified about one hundred times.

Fig. 2.



Trichina spiralis, in cysts, from muscular tissue of Ham. Magnified.

escent stage they may remain alive for many years, and after the death of their host may become mature in turn by entering the intestinal canal of some other host.

The symptoms caused by their presence in man vary according to the number eaten and the stage of development. At first nausea, loss of appetite, and intestinal irritation. Afterwards debility, fever, œdema of the face, movements of limbs painful, and sensitiveness of muscles on pressure. Lastly, great inflammation of intestines with bloody stools, increased muscular pains, partial paralysis of muscles of deglutition, speech, and respiration, and finally death from exhaustion. If only a small quantity of the trichinous pork be eaten, the symptoms will be mild, and in all cases they will disappear when the worms have become quiescent or encysted in the muscular tissue.

The history of the trichina is interesting, and may be briefly told as follows. Many years ago it was found in the muscles of man after death, and described by Owen. Subsequently Leidy found it, also encysted, in the flesh of the hog, and since then it has often been noticed in dissecting-room subjects, giving a sanded aspect to the red muscular tissue. It was always considered harmless, however, and in 1855 Küchenmeister published a theory that it was only the immature form of Trichocephalus dispar, a minute thread-like intestinal worm. Experiments conducted by Virchow and Leuckart, however, in 1859, by feeding animals with trichinous flesh, demonstrated the error of this opinion, and also the important facts that the encysted trichinæ were set free in the intestinal canal, there to become mature; that living embryos were developed within them, which escaped to wander in the muscular tissues of the same host, or might be transferred with the intestinal contents to another animal to become in turn the encysted form; and that the cysts were formed within and consisted of the thickened sarcolemma of the primitive muscular fibres, not, as had been supposed by some observers, within the capillary tubes.

These results pointed unmistakably to the manner in which man also became infected, but they were still considered of no pathological consequence until early in 1860, when a servant girl died in the hospital at Dresden, after a month's sickness, with symptoms like those above mentioned, and on examination after death Zenker found the muscular system filled with free and moving trichinæ. He concluded that it was a case of fresh infection, and that the worms had been the cause of her death. A microscopic examination of the contents of the intestine revealed the presence of numerous mature trichinæ of both sexes, the females still containing living embryos. Portions of the muscular tissue of the girl were sent to Virchow and others interested in the subject. The former administered it to a rabbit, which was killed by the wandering of the young brood set free within its intestine; the others, as well as Zenker, fed dogs with the same, but the results corresponded with those previously and subsequently obtained, viz., that trichina undergoes only a partial development within their intestinal canal, does not long remain there, and does not wander into their muscular system. It remained to be ascertained where the girl obtained the trichinæ which caused her death. She was taken sick after Christmas in the country where it was the custom to kill swine for the feast of the season, and Zenker, knowing the frequent occurrence of trichinæ in these animals, concluded that some connection would be found between the disease and the meat. On visiting the place, he found that the farmer with whom she had lived had killed a hog on December 31st, and that the ham and sausages, which still remained of it, contained numerous encysted trichinæ. He found, also, that the farmer and his wife and the butcher had all been ill with symptoms similar, though milder, to those the girl had exhibited.

This case, so complete in itself, not only established the connection between trichina in the hog and in man, but demonstrated the existence of an unsuspected and frightful disease, and explained much that had been mysterious in former cases of death from so-called sausage-poison and other unknown causes. It was followed by other epidemics of a fatal character, in several of which the victims were numbered by scores, so that a panic spread over Europe, and the hog seemed doomed to take his proper position as an unclean beast. Scientific commissions have been appointed by many governments to study the disease, and the natural history of this little worm has become of national and political importance, and has received the attention of some of the best scientific observers of the day.

It being established that man gets the disease from swine, these investigations have been directed to the source of infection in the latter animals. Many immature round worms have been found in animals and accused of being trichinæ, but more careful examinations and experiments have subsequently proved their innocence. Among these are to be mentioned worms found in moles, frogs, insects, and angle-worms, upon which swine are known to feed. Even vegetables have been laid under suspicion, and particularly a little nematoid worm which infests the beet-root, but this, too, was found to be zoölogically distinct. Statements have also been made that beef is not free from trichinæ, but there is no just ground for such reports, and the same may be said of the flesh of birds like ducks, geese, and pigeons, which might receive infection by means of the intestinal discharges of trichinous animals, for it has been found impossible to reproduce them by artificial feeding within these animals.

A committee appointed by the Imperial Society of Physicians, at Vienna, has just presented a report on trichinosis, in which it is stated that the real source of infection in swine lies entirely in the rat. In Moravia, thirty-seven per cent. of the rats examined were found trichinized, in the environs of Vienna about ten per cent., and in Lower Austria the proportion was not more than four per cent. The commission also confirms the results of previous experiments, as to the artificial transmission of the disease from the rat to the cat, to the rabbit, and to the pig by feeding. So far as man is concerned, however, it may be safely stated that his source of infection is practically limited to the hog, and there can be little doubt that the disease is kept up between the two precisely as the tape-worm continues to exist. The report of the Vienna commission, even if corroborated by more extended observations, has only added another source of infection in swine; there still remains the fact that many mature females escape from the intestines after impregnation, and in this way may be eaten by the animals. It is well known that when the diarrhœa is severe during the first stages of an attack of the disease, the patient is not so severely affected as others who have partaken of the same pork, and this is due to the escape of the parasite before the young are born in great quantity, and such persons, not sick enough to keep the house, are the probable sources of infection in swine. It has, in fact, been noticed by Virchow, that epidemics succeed each other at regular intervals. After infecting themselves in the way just described, the swine are not again killed until the next general slaughtering season comes, when another follows, to be succeeded by others after a similar interval. It may also be possible that portions of trichinous flesh may pass through the human intestine unchanged and thus be eaten by other animals, or that rats may eat it, and be subsequently eaten themselves by swine. We have seen that dogs cannot be made trichinous by eating diseased flesh, but they may discharge the contents of their intestines containing partially developed trichinæ where swine have access to them; and lastly, it is not impossible that swine may infect each other by intestinal trichinæ alone.

Trichinosis is no new disease. It existed many years ago, and it is undoubtedly as old as the habit of pork eating; we are only beginning to recognize it. In certain parts of Europe where raw pork is largely eaten in the form of ham and sausages, and where the habits of swine and their keepers are not very unlike, there is ample opportunity afforded for its spread and frequent occurrence. In our own country, too, there have been numerous small outbreaks, in nearly all of which some of the cases have been fatal. Within the last month six cases of the disease have occurred in this State, one of which proved fatal. They were caused by eating raw ham. The most careful attention, however, will not prevent the accidental infection of these animals, as the history of some of the epidemics illustrates. Unfortunately, the disease is latent in them, producing no symptoms which cause its presence to be suspected, and the appearances of the flesh after death are not such as to attract attention. It can only be recognized by its effect on those who unwarily eat it, or by microscopic examination.

In some parts of Germany government obliges all pork to be inspected by an appointed person, before it is sold, and even the butchers are forming associations among themselves for the same purpose, and are learning the use of the microscope, the present horror of pork affording them leisure for such studies. The inspection, however, should never be intrusted to an incompetent observer, and should be thoroughly performed. One of the latest cases of the disease in Prussia was produced by eating flesh which had passed examination, and subsequent investigation showed that only a portion of the shoulder had been sent for examination, and that other parts were abundantly infected. It has been found that the muscles contain most trichinæ nearest their attachments, and that in ham they occur in greatest numbers in these parts about the lower leg. Every hog should be examined in at least five places before it can be pronounced clean, for the parasites are sometimes distributed in the most unequal manner. In Brunswick, out of twenty thousand swine examined, but two were found to be trichinous, but it will be remembered that each of the two great epidemics in Germany were caused by eating the flesh of one animal alone, but these two animals caused the sickness of five hundred, and the death of over one hundred persons.

The results of the investigations of the Committee of the Chicago Academy of Sciences show, however, that the disease prevails among the swine in our Western States to a much greater extent than in Germany, for of 1,394 animals examined, twenty-eight were found trichinous, or one in fifty. Were the habit of eating raw ham and sausages as prevalent in America as in Germany, it will be seen, therefore, how frequent the disease might become amongst us. Fortunately, thorough cooking destroys the vitality of the young worms, but it should be carried to complete coagulation of all the juices of the flesh, even to its very centre, to be effectual.—J. C. W.

W. H. S., Pennsylvania.—It is quite essential for one who wishes to become a naturalist, to know enough of the Latin Language to be able to read Latin descriptions of species, and know the meaning and derivation of Latin words. A little study will give one enough knowledge of the language for ordinary practical purposes. A large number of scientific terms are derived from the Greek, some knowledge of which is indispensable to the naturalist.

Mr. George B. Emerson, in an article on the Study of Latin Grammar, published in the Massachusetts Teacher, April, 1867, says that "D'Arcy W. Thompson, a man of genius, now Professor of Greek in Queen's College, Belfast, Ireland, author of the 'Day Dreams of a Schoolmaster,' will engage to put all the Latin Grammar necessary to make a good scholar of a boy, into twenty-four pages of a little work that shall sell for sixpence."

Read also the Inaugural Address, delivered at the University of St. Andrews, Feb. 1, 1867, by John Stuart Mill (published in Littell's Living Age, Boston, No. 1,189). This treats in a very comprehensive way of the study of science and the classics. It should be read by every naturalist.

We shall issue a title-page and full index at the close of each volume of the *Naturalist.*

G. W. P., New York.—The insect you enclose is a False-Scorpion (*Chelifer*). The large claws are adapted for seizing their prey, as the habits of the insect are somewhat like those of the Scorpion, though from its different structure it is more closely allied to the Mites.

NATURAL HISTORY CALENDAR.

The Insects of June.—In our monthly calendars we propose to notice more fully than heretofore the *injurious* insects. References to the times of their appearance must be necessarily vague, and apply only, in a very general way, to the Northern States. Insects appear in Texas about six weeks earlier than in Virginia, in the Middle States six weeks earlier than in northern New England and the North-western States, and in New England about six weeks earlier than in Labrador. The time of the appearance of insects corresponds to the time of the flowering or leafing out of certain trees and herbs; for instance, the larvæ of the American Tent Caterpillar, and of the Canker-worm, hatch just as the apple-tree begins to leaf out; a little later, the Plant-lice appear, to feast on the tender leaves, and when, during the first week in June, our forests and orchards are fully leaved out, hosts of insects are marshalled to ravage and devour their foliage.

1st to 15th.—Early in the month the Parsnip Butterfly (*Papilio Asterias*) may be seen flying over beds of parsnips, laying its eggs for